

AMERICAN PSYLLIDÆ III (Triozinæ)

BY D. L. CRAWFORD

The following descriptions complete the study of the *Triozinæ* as based on the material now at hand. The synopses which accompany the descriptions will supersede and replace the provisional synopsis as published in an earlier number of the JOURNAL. Although there are several new genera and many new species here presented, yet there must be many more new forms in America still, and until these are studied thoroughly nothing in the nature of a monograph can be attempted. In the interest of science, therefore, it is hoped that all the material possible will be made available for study, for the furtherance of the knowledge of this important group of insects.

The facial cones furnish striking and constant generic characters, as do also the pronotum and mesothorax. Undue emphasis, however, was at first put on the position and trend of the facial cones; this is of secondary importance, to be sure, but not a primary diagnostic character, since it separates synoptically the sexes of a species, as occurred in *T. tripunctata* (Fitch) Riley. A striking variation occurs in the form of the pronotum. In the genus *Allotriozia* the pronotum is relatively very long and extending on its dorsal surface from the anterior margin of the dorsulum to the posterior margin of the vertex. In all or most of the other *Triozinæ* the pronotum is relatively shorter and is partially concealed by descending behind the posterior margin of the vertex, and does not attain posteriorly to the surface of the dorsulum; this has been spoken of as the pronotum depressed below the dorsulum and head. The dorsulum in the latter case is usually roundly pointed cephalad, and of rather a spherical-triangular shape.

Very good diagnostic characters lie in the genitalia of the male, but since often only the female is represented in the collections, these characters can not well be used. In the preliminary study the term *anal projection* was suggested for the dorsal portion of the male genitalia. The term *anal valve* is more suitable and will be used hereafter. The lateral view of the anal valve is very important and should always be represented by a good clear figure. Of the female genitalia three general types are easily recognizable: the short, the long, and the extremely long and slender. The first is, typical in the species *Triozia salicis*, the second in *T. quadripunctata*, and the third in *T. longistylus*.

The veins of the forewings are nearly always set with fine microscopic hairs at regular intervals, but with very few exceptions these setæ are visible only under very high power; occasionally, however, as in *T. mexicana*, they are more conspicuous and easily visible under a low power of magnification. In many forms the wing membrane is covered with punctural dots but these are not visible except under the high power; in a few species these are very conspicuous, giving a fulvous, smoky appearance to the wing.

Synopsis of the Genera of Triozinae

- A. Radius longer than basal portion of subcosta.
- B. Facial cones (as cones) entirely wanting or sub-obsolete.
- C. Vertex very deeply emarginate anteriorly at median suture, with the antennae attached to the projecting rostra. Facial cones entirely wanting.
- D. Bi-rostrate appearance of head very marked; emargination very deep. Third antennal segment not very thick midway, sometimes somewhat enlarged. *Rhinopsylla* Riley
- DD. Bi-rostrate appearance of head not so conspicuous, emargination deep but less than above. Third antennal segment very much enlarged and thickened midway, thicker than succeeding segments and almost as thick as preceding. *Bactericera* Puton.
- CC. Vertex not deeply emarginate anteriorly, without the peculiar bi-rostrate appearance. Facial cones sub-obsolete, with merely globose projections at insertion of antennae. *Epitrioza* Crawford.
- BB. Facial cones (as cones) not entirely wanting.
- C. Pronotum long, quite flat, not depressed below dorsulum and head; dorsulum not strongly arched. *Allotrioza* Crawford.
- CC. Pronotum short, arched and distinctly descending cephalad; distinctly depressed below dorsulum and head; dorsulum quite strongly arched.
- D. Facial cones exceedingly short and small, scarcely projecting beyond vertex; labrum easily visible from in front; antennae inserted on frons and base of facial cones; vertex distinctly raised plate-like, and usually conspicuously colored; margin of vertex colored differently from discal portion. Anal valve of male genitalia bilobate; claspers not acute at apex. *Paratrioza* Crawford.
- DD. Facial cones at least moderately long, or not exceedingly short; labrum not visible from in front.
- E. Thorax broader than entire width of head including eyes. Facial cones normal, usually moderately long, rather acutely rounded apically, more or less divergent. *Trioza* Forster. (*Petalolyma* Scott)
- EE. Thorax distinctly narrower than entire width of head including eyes. Facial cones long, very slender and acute, closely appressed and not divergent in the least. *Neotrioza* Crawford.
- AA. Radius shorter than basal portion of subcosta; discoidal portion of subcosta almost wanting. *Cecropsylla* Riley.

General Revised Synopsis of the Genus *Trioza*

- A. Forewings not entirely hyaline; with more or less dark banding.
- B. Subcosta bordered with dark band; radius straight, shorter than second cubital; first furcal two-thirds as long as third; genital segment of female very short; anal valve of male obtriangular, with large posterior lobe. *T. californica* Crawf.

- BB. Both cubital veins and radius bordered with dark bands; marginal cells darkened; radius long, flexed midway; first and third furcals subequal; female genital segment quite long; anal valve of male obtriangular, with large posterior lobe.
T. tripunctata (Fitch) Riley.
- BBB. Hind margin darkened from tip of clavus to apex of wing and through both marginal cells; radius straight, rather short; female genital segment short; anal valve small, with a rectangular posterior lobe.
T. marginata Crawf.
- AA. Forewings without stripes or bands, hyaline or slightly fulvous.
- B. Setæ on veins of forewing conspicuous; membrane of wing with punctural dots. Facial cones large. Female genital segment long. Anal valve large, arcuately lobate posteriorly.
- C. Body large; wings quite fulvous; setæ on veins prominent.
T. mexicana Crawf.
- CC. Body rather small; wings but slightly fulvous; setæ not prominent.
T. mexicana minuta Crawf.
- BB. Setæ on veins of forewings very inconspicuous or wanting; wing membrane with few or no punctural dots.
- C. Dorsum and vertex conspicuously pubescent.
- D. Pubescence long, quite dense. Vertex bulging; facial cones very short; pronotum short. Wings large; second marginal cell unusually large. Female genital segment moderately long; anal valve of male almost as large as ventral plate and similar in shape, with a dorsal epiphysis.
T. diospyri Ashmead.
- DD. Pubescence not long, somewhat pulverulent. Vertex flat; facial cones moderately long; pronotum quite long. Wings not large; marginal cells subequal. Female genital segment rather long; anal valve of male small.
T. bakeri Crawf.
- CC. Dorsum and vertex not pubescent, or if so, very inconspicuously.
- D. Facial cones very short and broadly rounded apically, quite vertical. Female genital segment exceedingly long and acute. Pronotum quite long.
- E. Epimeron long, visibly as long as episternum. Cone into eye more than twice; labrum very large. Genital segment nearly one-fourth as long as rest of body.
T. longistylus Crawf.
- EE. Epimeron concealed partially, visibly not as long as episternum. Cone into eye scarcely more than twice; labrum not large.
- F. Epimeron visibly half as long as episternum. Style-like process of female genital segment about as long as basal portion.
T. collaris Crawf.
- FF. Epimeron visibly only about one-fourth as long as episternum. Facial cones extremely short. Style of female fully twice as long as basal portion of genital segment. *T. proximata* Crawf.

- DD. Facial cones not very short, at least moderately acute apically. Female genital segment not extremely long and acute. Pronotum usually rather short.
- E. Wings very broadly rounded apically, without any angulation whatever (*T. longicornis* is typical of a rounded wing; *T. similis* and *T. albifrons* I consider slightly angulated); furecation of second cubital on or behind long axis of wing from base of subcosta to apex of wing. Facial cones long, divergent.
- F. Thorax and vertex quite conspicuously striped and banded with yellowish white on dark ground color. *T. varians* Crawf.
- FF. Thorax and vertex not striped or banded.
- G. Facial cones quite horizontal, easily visible from above. Radius short, straight; fourth furcal one-half as long as second cubital. *T. rotundipennis* Crawf.
- GG. Facial cones subvertical, only slightly visible from above. Radius long, curved; fourth furcal less than one-third as long as second cubital. *T. longicornis* Crawf.
- EE. Wings not very broadly rounded, as above; more or less angulated or acute apically; furecation of second cubital usually in front of the long axis of wing. Facial cones not very long.
- F. Length of forewing distinctly less than 3 mm. Body very small. Facial cones short, subacute.
- G. Genital segment of female long, with a short, slender ovipositor sheath. Labrum small. Prepimeron mostly concealed, visibly only half as long as episternum; forecoxae mostly visible. *T. nicaraguensis* Crawf.
- GG. Genital segment of female very short; dorsal plate very obtuse. Labrum relatively large. Prepimeron visibly as long as or longer than episternum; forecoxae mostly concealed.
- H. Facial cones straight and quite parallel on inner margin, scarcely divergent. *T. minuta* Crawf.
- HH. Facial cones not entirely straight, somewhat divergent. Body slightly larger. *T. minuta similis* Crawf.
- FF. Length of forewing fully 3 mm. or more. Body not unusually small.
- G. Radius short, straight, without a curve; subcosta nearly or fully as long as margin of radial cell.
- H. Hind margin of wing with four spots visible to unaided eye, one on margin of each marginal cell, one on cubital cell, and one on anal angle. Vertex glabrous. Prepimeron mostly visible. *T. quadripunctata* Crawf.
- HH. Hind margin without four easily visible spots; three usual marginal spots present. Vertex slightly pubescent. Prepimeron mostly concealed.

- I. Body brownish red to orange. Thorax quite strongly arched; notal pubescence very inconspicuous. *T. frontalis* Crawford.
- II. Body dark reddish brown. Thorax less strongly arched; notal pubescence slightly more conspicuous.
T. frontalis sulcata Crawford.
- GG. Radius quite long, not straight, curved more or less in distal half. Cubcosta distinctly shorter than margin of radial cell.
- II. Head, facial cones, and notum whitish; vertex bulging, with a short sulcate impression midway on each side of median suture. Female genital segment short; anal valve of male spatulate.
T. albifrons Crawford.
- HH. Head, facial cones and notum not whitish, vertex usually more extensively impressed.
- I. Facial cones scarcely divergent; head usually black.
- J. Facial cones almost straight on inner margin, scarcely divergent throughout; cone into eye 1. *T. salicis* Mally.
- JJ. Facial cones conical, but slightly divergent, not straight on inner margin as above. Cone into eye $1\frac{1}{4}$.
T. nigrifrons Crawford.
- II. Facial cones distinctly divergent, conical. Cone into eye 1 or less. Head usually orange colored.
- J. Vertex conspicuously bulging over insertion of antennæ. Facial cones moderately long, and quite stout and divergent. Female genital segment moderately long; anal valve of male ovoid.
T. assimilis Crawford.
- JJ. Vertex not conspicuously bulging over insertion of antennæ.
- K. Wings slightly fulvous, not entirely clear. Vertex not deeply impressed.
- L. Wings quite conspicuously fulvous; somewhat rounded at apex. Præpisternum short and relatively broad. Vertex between eyes four times the width of eye. Anal valve of male small, simple.
T. fulvida Crawford.
- LL. Wings inconspicuously fulvous; rather subacute at apex. Præpisternum long and relatively slender. Vertex three times width of eye. Anal valve large, with a posterior lobe.
T. aurantiaca Crawford.
- KK. Wings not fulvous, perfectly clear.
- L. Vertex with a marked sulcate impression on each side of median suture. Facial cones slender, very divergent. Female genital segment moderately long.
- M. Abdomen white ventrad. Facial cones very slender.
T. similis Crawford.
- MM. Abdomen unicolored, ventrad and dorsad. Facial cones not so slender.
T. similis forcealis Crawford.

- LL. Vertex without marked sulcate impression; usually with a shallow impression. Facial cones not very slender, quite divergent.
- M. Wings somewhat rounded at apex. Cone into eye less than I. Anal valve of male small and simple.
T. fulvica similis Crawl.
- MM. Wings subacute at apex. Cone into eye fully I. Anal valve of male quite long with a posterior epiphysis.
T. nigra Crawl.

Synopsis of the Genus *Trioza* Based Principally on the Genitalia

- A. Female genital segment very short, scarcely longer than preceding ventral sclerite.
- B. Dorsal plate of female genitalia rhomboidal, not arched between apex and genital pore, nor on ventral surface. Wings very broadly rounded.
- C. Ventral plate of female triangular; without epiphysis at apex. Fourth furcal less than one-fourth as long as second cubital; radius long. Facial cones subvertical, long.
T. longicornis Crawl.
- CC. Ventral plate of female rounded, with an acute epiphysis at apex. Fourth furcal about one-half as long as second cubital; radius rather short.
- D. Anal valve of male simple, converging toward apex, somewhat knobbed at tip. Facial cones almost horizontal, long.
T. rotundipennis Crawl.
- DD. Anal valve of male not simple, with a moderately large posterior lobe. Facial cones subvertical, rather long. Head and thorax more or less striped and banded.
T. varians Crawl.
- BB. Dorsal plate of female not rhomboidal, rounded on both upper and lower surfaces. Wings not very broadly rounded.
- C. Forewing with black or brown band. Radius straight, rather short. Anal valve of male with a posterior lobe.
- D. Subcosta bordered with conspicuous black band for entire length.
T. californica Crawl.
- DD. Subcosta normal; hind margin with brown band from tip of clavus to apex of wing and through both marginal cells.
T. marginata Crawl.
- CC. Forewings without bands or stripes. Radius usually curved.
- D. Facial cones scarcely divergent, rather short.
- E. Facial cones almost straight on inner margin, not conical.
- F. Body small; wings very small. Dorsal plate of female very obtuse at apex.
- G. Facial cones scarcely divergent, quite straight on inner margin.
T. minuta Crawl.
- GG. Facial cones slightly divergent in apical half. Body slightly larger.
T. minuta similis Crawl.

- FF. Body normally large; wings normal. Dorsal plate of female quite acute apically. *T. salicis* Mally.
- EE. Facial cones quite distinctly conical in shape, but only slightly divergent. *T. nigrifrons* Crawf.
- DD. Facial cones distinctly divergent, conical in shape, and quite long.
- E. Anal valve of male simple, small, convergent to apex; claspers very small.
- F. Wings fulvous. *T. fulvida* Crawf.
- FF. Wings clear. *T. fulvida similis* Crawf.
- EE. Anal valve not simple, rather large, with a posterior lobe.
- F. Posterior lobe of anal valve quite large, reaching beyond base of claspers. Dorsal plate of female subacute and curved down in apical half. *T. aurantiaca* Crawf.
- FF. Posterior lobe of anal valve small, short, scarcely more than an epiphysis. Dorsal plate of female not curved down as above. *T. nigra* Crawf.
- AA. Genital segment of female not short, distinctly longer than preceding ventral sclerite; usually more than twice as long.
- B. Female without long, slender, acute, style-like ovipositor sheath; genital segment only moderately long.
- C. Vertex and notum conspicuously pubescent.
- D. Pubescence long, quite dense; vertex bulging; facial cones very short. Pronotum short. Wings large; second marginal cell unusually large. Anal valve of male about as large as ventral plate and similarly shaped. *T. diospyri* Ashm.
- DD. Pubescence not long, pulverulent; vertex flat. Facial cones moderately long. Pronotum quite long. Wings not large; marginal cells subequal. Anal valve of male small. *T. bakeri* Crawf.
- CC. Vertex and notum not conspicuously pubescent.
- D. Genital segment of female about as long as wide dorso-ventrally. Anal valve not spatulate.
- E. Dorsal and ventral plates equally long, quite stout, and not acute at apex. Vertex conspicuously impressed discally.
- F. Abdomen white ventrad. Facial cones very slender and acute. *T. similis* Crawf.
- FF. Abdomen unicolored. Facial cones not very slender. *T. similis fovealis* Crawf.
- EE. Dorsal plate distinctly longer and less acute than ventral. Vertex scarcely impressed discally.
- F. Veins of wing set with double row of setae. Anal valve straight on anterior margin, roundly lobate posteriorly; claspers large, not acute at apex.
- G. Setae on veins quite prominent; wing somewhat fulvous; punctural dots on wing membrane conspicuous. Body large, robust. *T. mexicana* Crawf.

- GG. Setae less prominent; wings less fulvous; punctural dots not conspicuous. Body smaller. *T. mexicana minuta* Crawford.
- FF. Veins of wing without setae, or if present scarcely visible. Anal valve of male ovoid, extending caudad. Claspers slender, curved, acute apically. *T. assimilis* Crawford.
- DD. Genital segment of female distinctly longer than dorso-ventral width. Anal valve more or less spatulate.
- E. Both cubital veins and radius bordered with brown or black band. Anal valve large, with a large posterior lobe. *T. tripunctata* (Fitch) Riley.
- EE. Cubitals and radius without dark bands. Anal valve without large posterior lobe.
- F. Anal valve very large, spatulate, both margins subequal in length; with a bifurcate ridge extending from base toward each dorsal corner.
- G. Body brownish red to orange. Thorax quite strongly arched. Notum finely and inconspicuously pubescent. *T. frontalis* Crawford.
- GG. Body dark reddish brown. Thorax less strongly arched. Notal pubescence slightly more conspicuous. *T. frontalis sulcata* Crawford.
- FF. Anal valve not unusually large, subspatulate; posterior margin much shorter than anterior; bifurcate ridge wanting.
- G. Forewing with four spots on hind margin visible to unaided eye, one on margin of each marginal cell, one on cubital margin, and one on anal angle. Vertex orange to brown. Margins of anal valve arcuate. *T. quadripunctata* Crawford.
- GG. Forewing without four visible spots; three usual spots present. Vertex and facial cones whitish. Margins of anal valve quite straight. *T. albifrons* Crawford.
- BB. Female with a long, slender, acute ovipositor sheath; with basal portion of genital segment large, subspherical; genital segment very long. Facial cones quite short.
- C. Produced ovipositor sheath not longer than enlarged basal portion of genital segment.
- D. Produced sheath very short; body very small. Wing less than 2.5 mm. in length. Facial cones subacute. *T. nicaraguensis* Crawford.
- DD. Produced sheath about as large as enlarged portion. Body normally large. Wing more than 3.3 mm. in length. Facial cones rounded. *T. collaris* Crawford.
- CC. Produced ovipositor sheath much longer than basal portion of genital segment. Facial cones very short and rounded.
- D. Genital segment less than one-fourth the length of rest of body. Prepimeron visibly as long as episternum. *T. longistylus* Crawford.
- DD. Genital segment fully one-fourth as long as remainder of body. Epimeron mostly concealed, visibly shorter than episternum. *T. proximata* Crawford.

***Trioza tripunctata* (Fitch) Riley**

(Fig. 152, A; 153, G; 154, A; 155, A)

(Psylla tripunctata Fitch) (Non *Trioza tripunctata* Low)

Length of body (female) 2.8 mm.; (male) 2.3 mm.; length of forewing 3.5 mm.; greatest width 1.5 mm.; width of vertex between eyes .49 mm.; with eyes .80 mm.; general color brown to dark brown, dorsum black; head lighter; antennæ yellowish, black at tip.

Head deflexed, rather coarsely punctate, with eyes not as broad as thorax. Posterior margin of vertex narrowly elevated over middle half, slightly arcuate; vertex raised plate-like on each side of median suture; with a shallow, oblique depression on each side extending from posterior marginal ridge toward front and eyes; anterior margin of plates down-curved and emarginate at median suture. Eyes very prominent; anterior ocellus imbedded between conical insertion of antennæ and base of facial cones. Facial cones medium in length, rounded apically, quite divergent, subvertical, moderately pubescent. Antennæ of usual *triozal* form, yellowish, except two apical segments and tips of intermediate segments black.

Thorax coarsely punctate, quite strongly arched. Pronotum moderately short, distinctly depressed below head and dorsulum; dorsulum quite heavy, ascending strongly, roundly acute cephalad, about as long as scutum. Metasternal spurs short. *Wings* quite large, roundly acute apically, almost two and one-half times as long as broad, broadest across middle of first marginal cell, distinctly narrowed in basal half; hyaline, except three brown bands along first and second cubital and radial veins and covering both marginal cells; radius not quite as long as second cubital, flexed midway; marginal cells subequal and similar in shape; third furcal vein very short; ventation brown, conspicuous.

Male.—Genital segment prominent, not as long as two preceding segments; claspers stout, simple, long; anal valve large, extending beyond base of claspers. Pubescence short and sparse. *Female*.—Genital segment very long, almost as long as rest of abdomen, very slender and acute; dorsal plate slightly overreaching ventral and less acute; genital pore scarcely one-fourth as long as dorsal plate; ventral plate very acute; ovipositor very long and acute (exserted in type female); pubescence sparse and short.

Redescribed from one male and one female taken by Mr. F. A. Serrine at Jamaica, Long Island, October 11th.

This species was described briefly by Fitch in 1851 as follows: "Wax yellow, dorsum black; legs and antennæ pale yellow, the latter black at the tips; elytra hyaline, nerves brown, beyond the furcation widely margined with smoky fulvous; a blackish dot on the middle of the terminal margin of each of the inner apical cells. Length 0.16 inch." The specific name was derived from the three marginal dots common to nearly all the *Triozas*. In 1877 Franz Low described a new European Psyllid as *Trioza tripunctata*, not knowing of course that there was another *Trioza* of the same name then classed as a *Psylla*. In 1893 Riley placed Fitch's *Ps. tripunctata* in the genus *Trioza*,

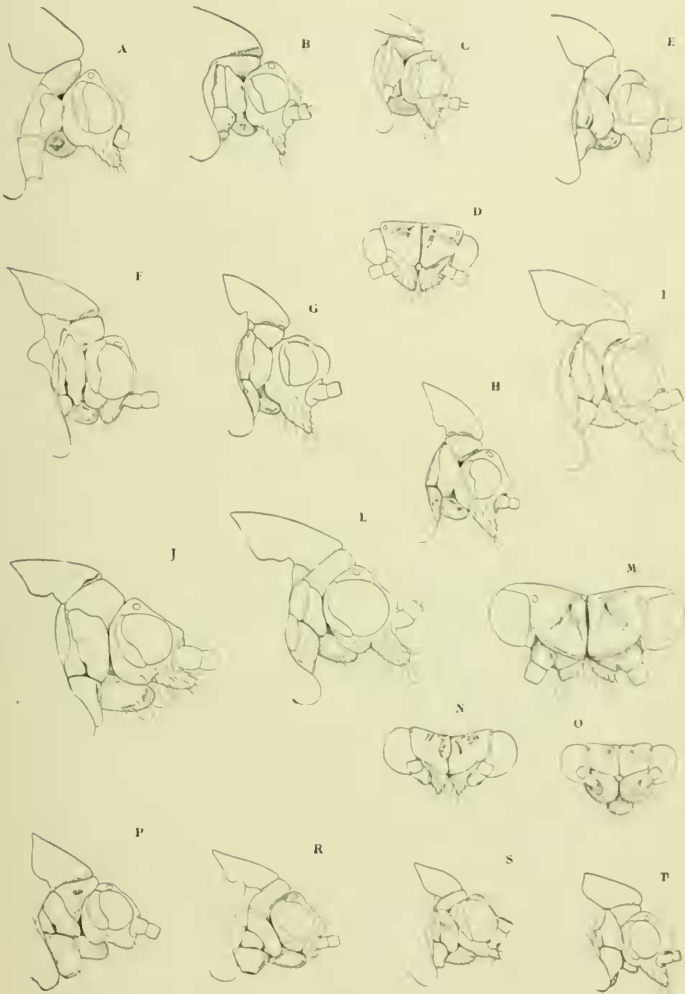


Figure 152. Heads of Triozinae:

A, *Trioza tripunctata*; B, *T. saheis*; C, D, *T. minuta*; E, *T. quadripunctata*; F, *T. longistylus*; G, *T. assimilis*; H, *T. similis fovealis*; I, *T. mexicana*; J, *Allotrioza arbolensis*; L, *A. magnoliae*; N, *A. arbolensis*; N, *Paratrioza ocellata*; O, *Epitrioza medicaginis*; P, *E. oaxacensis*; R, *E. medicaginis*; S, *Paratrioza ocellata*; T, *Trioza nearaguensis*.

thus making two members of the genus bear the same name. According to Section 69 of the code of nomenclature now in preparation by the Entomological Society of Washington the *tripunctata* of Low must be changed. In 1908 the Japanese entomologist, Kuwayama, described a new *Psylla*, naming it *Ps. tripunctata*. Since this name is already synonymical in that genus from Fitch's original description, this name can not be attached to the new Japanese species. This may become instead *Psylla kuwayamai* n. n.

Trioza salicis Mally

(Fig. 152, B; 154, D; 155, B)

Length of body 1.9 mm.; length of forewing 3.0 mm.; greatest width 1.3 mm.; width of vertex between eyes .40 mm.; with eyes .68 mm. General color orange yellow to brown, notum and head darker; antennæ black in apical half.

Head deflexed, very finely punctate, with eyes not as broad as thorax. Posterior margin narrowly elevated over middle three-fifths, only slightly arcuate; discal area with broad shallow depression on each side of median suture, and bi-lobately projecting, with anterior ocellus imbedded under it at base of facial cones; vertex not raised plate-like. Facial cones rather short, acute, almost parallel on inner margin and scarcely divergent, almost vertical, sparsely pubescent apically. Antennæ inserted on front below eyes, within; insertion yellow, the rest of vertex, front and facial cones black or dark brown.

Thorax arched, rugosely punctate. Pronotum short, much depressed below dorsulum and head; propimeron very distinctly visible. Dorsulum quite large, strongly ascending, rather acute anteriorly; lighter in color on anterior portion than posteriorly; meta-sternal spurs short. Wings hyaline, about two and a half times as long as broad, broadest across first furcal, subacute apically; anal vein very heavy and dark; venation very light brown.

Female.—Genital segment very short, scarcely longer than two preceding tergites or anal ventral sclerite; dorsal plate overreaching ventral, almost glabrous, pubescence very sparse and brief; genital pore almost half as long as dorsal plate; ventral plate acutely beaked apically.

at Ames, Iowa, and from several females collected at Algonquin, Illinois; all specimens were taken either in September or October.

This species was first described by Mally in 1895 from specimens taken on willow (*Salix*) at Ames, Iowa. His description is taken up mostly with coloration and wing venation, two characters which are of little specific value in this genus. The male genitalia are scarcely described and not figured, and unfortunately there is no male specimen in this collection. Consequently this character must be described at some future time.

Trioza minuta Crawl.

(Fig. 152, C, D; 154, B; 155, C)

Length of body 1.7 mm.; length of forewing 2.6 mm.; greatest width .9 mm.; width of vertex between eyes .40 mm.; with eyes .62 mm. General color very light orange yellow throughout; antennæ black apically.

Head quite strongly deflexed, very slightly impunctate, with eyes not as broad as thorax. Posterior margin of vertex arcuate, slightly elevated over middle one-third, scarcely emarginate at median suture, vertex scarcely raised plate-like; discal area with a small fovea on each side posteriorly and a shallow divergent depression extending downward toward front. Facial cones short, vertical, scarcely divergent, almost straight and parallel on inner margin, quite acute, pubescence short and sparse. Antennae inserted on frons and side of facial cones; form of antennae as usual in genus.

Thorax not strongly arched, more coarsely punctate than vertex, rather slender. Pronotum short, depressed below head and dorsulum, nearer to level of dorsulum than of head. Dorsulum ascending, about as long as scutum. Metasternal spurs short. Wings hyaline, very slender, fully three times as long as broad, broadest across first marginal cell, subacute apically; first furcal quite short, second and fourth subequal; venation brownish yellow, not conspicuous.

Female.—Genital segment very short, about as long as two preceding tergites; dorsal plate very slightly longer than ventral, very broadly rounded apically; ventral plate acute and somewhat beaked at tip; pubescence short and sparse.

Described from three females from Arizona in the C. F. Baker collection.

Trioza minuta similis Crawford

Body small, slightly larger than species. Vertex very similar in form, facial cones less parallel and straight on inner margin, more divergent. Thoracic characters very similar to species. Wings slightly larger, but similarly veined. Female genitalia quite similar to species. *Male*.—Genital segment rather short; claspers slender, simple, incurved apically. Anal valve proportionately rather large, bilobate, with posterior lobe.

Described from several males and females from Oregon in the C. F. Baker collection.

Trioza quadripunctata Crawford

(Fig. 152, E; 153, H; 154, C; 155, D)

Length of body 2.3 mm.; length of forewing 3.3 mm.; greatest width 1.5 mm.; width of vertex between eyes .42 mm.; with eyes .71 mm. General color greenish yellow; antennae black in distal half.

Head deflexed, somewhat punctate, with eyes almost as broad as thorax. Posterior margin of vertex narrowly elevated over middle two-thirds, slightly arcuate; vertex not elevated plate-like; discal area with a small fovea on each side between median suture and posterior ocellar area, and a sulcate depression extending obliquely toward front and lower margin of eye, broadly and deeply emarginate anteriorly at median suture, and protruding bilobately over frons; median suture distinctly emarginate; facial cones medium in length, rather acute, quite strongly divergent, usually subvertical, sometimes almost horizontal, pubescence rather sparse and brief. Antennae inserted under pro-

truding vertical lobes above base of facial cones; antennal impressions scarcely larger than scape.

Thorax strongly arched, more coarsely punctate than vertex. Pronotum rather long, depressed below head and dorsulum but not as much as usual; prepisternum long, reaching arcuately almost to suture of dorsulum and mesopleurites. Dorsulum large, about as long as scutum, roundly acute cephalad. Metasternal spurs short. *Wings* hyaline, relatively quite broad, only a trifle more than twice as long as broad, broadest across middle of first marginal cell, rounded apically but not broadly so; radius almost straight; marginal cells subequal; with four distinctly visible maculae on posterior margin, the largest in first marginal cell, one on margin of cubital and second marginal cells and the fourth at tip of clavus; venation light brown.

Male.—Genital segment large, larger than two preceding sclerites; dorsal surface of plate ascending caudad; claspers long, simple, arcuate and incurved; anal valve about as long as claspers, with a small posterior lobe on each lateral flap; pubescence sparse. Abdominal tergites short, extending about to third ventral sclerite. *Female*.—Abdomen much heavier and broader than in male. Genital segment long, almost as long as rest of abdomen, quite acute apically; dorsal plate slightly longer and less acute than ventral; genital pore fully one-third as long as dorsal plate.

Described from one male and four females from Colorado; collector C. F. Baker.

Trioza longistylus Crawford.

(Fig. 152, F; 154, E; 155, E)

Length of body with ovipositor 3.1 mm.; without ovipositor 2.5 mm.; length of forewing 3.9 mm.; greatest width 1.6 mm.; width of vertex between eyes .48 mm.; with eyes .90 mm. General color greenish yellow; body quite large and robust.

Head strongly deflexed, quite coarsely punctate on vertex and frons, with eyes not as broad as thorax. Posterior margin of vertex narrowly elevated, arcuate; vertex not raised plate-like; discal area on each side with an angulate-sulcate depression diverging from posterior marginal ridge toward frons and lower margin of eye; elevation along median suture quite broad; anterior margin not deeply emarginate at median suture. Facial cones short, rounded apically, divergent only in distal half, quite vertical, scarcely pubescent. Antennae inserted on frons below termination of frontal sulca.

Thorax strongly arched, more coarsely punctate than vertex. Pronotum quite long, somewhat depressed below head and dorsulum; with a fovea on each side above episternum. Dorsulum large, rather broadly rounded cephalad, strongly ascending; dorsulum caudad and scutum rugulose. *Wings* large, hyaline, about two and a half times as long as broad, broadest across first marginal cell, rounded apically but not broadly so; first marginal cell slightly larger than second; second furcal distinctly arched; second cubital about twice the length of fourth furcal; radius about as long as second cubital; claval margin very heavy and prominent; venation light brown.

Female.—Abdomen robust. Genital segment large, subglobose, greatly produced caudad; dorsal plate slightly shorter than ventral; genital pore very small; both plates produced into an ovipositor sheath longer than genital segment basally; sheath and style together almost one-fourth as long as rest of body. Pubescence very sparse and brief.

Described from three females in the C. F. Baker collection, two taken in Colorado and one in Santa Clara County, California.

This species is very closely related to *Trioxa collaris* Crawford, but differs in the following characters: *T. collaris*—Facial cones not broadly rounded; prepimeron short, not visibly as long as episternum; dorsulum with an acute epiphysis cephalad; both pronotum and dorsulum very sparsely pubescent; ovipositor sheath and style about as long as rest of genital segment. *T. longistylus*—Facial cones broadly rounded apically; prepimeron visibly fully as long as episternum; dorsulum without epiphysis cephalad; pronotum and dorsulum not pubescent; ovipositor sheath and style twice as long as rest of genital segment.

The two species are, however, of the same type and should not have been so far separated in the preliminary synopsis.

Trioxa proximata n. sp.

(Fig. 153, J; 155, F)

Length of body (female with ovipositor) 3.4 mm.; (without ovipositor) 2.7 mm.; male 2.4 mm.; length of forewing 3.7 mm.; greatest width 1.5 mm.; width of vertex between eyes .44 mm.; with eyes .78 mm. General color light greenish yellow.

Head moderately deflexed, with eyes not as broad as thorax, punctate. Posterior margin of vertex narrowly elevated; vertex not raised plate-like; discal area excised and impressed very similarly to *T. longistylus*; elevation along median suture quite prominent; anterior margin slightly emarginate at median suture. Facial cones short, rounded apically, more or less straight and parallel on basal half of inner margin, somewhat divergent distally, vertical to subvertical, moderately pubescent. Antennae inserted on frons and base of facial cones laterad. Eyes prominent.

Thorax arched, more coarsely punctate than vertex. Pronotum moderately long, depressed below head and more or less below dorsulum; with a fovea on each side above pleurites. Dorsulum large, quite acutely rounded cephalad, sometimes almost pointed. Meta-sternal spurs very short. *Wings* hyaline, about two and a half times as long as broad, broadest across first furcal, broadly rounded apically; radius longer than second cubital; fourth furcal more than half as long as second cubital.

Male.—Abdomen slender. Genital segment large, prominent; anal ventral sclerite small. Genital plate large, rounded; claspers long, slender, simple, curved forward and inward; penis long, slender; anal valve large, longer than claspers, almost straight on anterior margin, posterior margin broadly rounded, except distally; with a small epiphysis distally. Pubescence sparse and brief,

longer on anal valve. *Female*.—Genital segment and ovipositor very similar to that of *T. longistylus*; dorsal plate somewhat longer than ventral; sheath and style together fully one-fourth as long as rest of body. Pubescence brief and sparse.

Described from three females and four males collected at Oaxaca, Mex., and two females at Orizaba, Mex., coll. D. L. Crawford.

This species is very closely related to *T. longistylus* and *T. collaris* Crawford. The principal and most constant variation between these three species lies in the dorsulum, facial cones, and female genitalia. In all probability the male of the two United States species, still unknown, will prove to be very similar in respect to genitalia to the Mexican form.

Trioza nicaraguensis Crawl.

(Fig. 152, T; 154, F; 155, K)

Length of body 1.7 mm.; length of forewing 2.3 mm.; greatest width .8 mm.; width of vertex between eyes .36 mm.; with eyes .56 mm. General color lemon yellow; antennæ black apically. Insect small.

Head moderately deflexed, quite coarsely punctate, with eyes not quite as broad as thorax. Posterior margin of vertex arcuate, scarcely elevated narrowly; vertex not raised plate-like; discal area with a fovea on each side midway between median suture and posterior ocellar region; without a depression or sulcus, or if present very slight; lobately produced cephalad over anterior ocellus, scarcely emarginate at median suture. Facial cones rather short, acute, moderately divergent, more so in distal half than in basal, subvertical, very slightly and inconspicuously pubescent. Antennæ slender, inserted at base of facial cones below produced vertex laterad. Eyes comparatively appressed, not as prominently bulging as usual. Labrum small.

Thorax not large, arched but not strongly so. Pronotum short, depressed below head and dorsulum; præpiterum large, subtrapezoidal; epimeron almost invisible; fore coxæ large, mostly visible. Dorsulum quite acutely rounded cephalad, slightly overhanging pronotum. *Wings* small, slender, delicate, hyaline, about three times as long as broad, broadest across first marginal cell, subacute apically; radius not as long as second cubital; marginal cells subequal; venation yellowish, not conspicuous.

Female.—Genital segment quite large, almost as long as rest of abdomen; dorsal plate smaller; both plates about equal in length; genital pore large about one third as long as dorsal plate; both plates produced caudad into a short ovipositor sheath; sheath and style not quite as long as rest of genital segment. Pubescence sparse and brief.

Described from one female collected in San Marcos, Nicaragua, by C. F. Baker.

Trioza frontalis sulcata (Crawf.)

(Syn. *Trioza sulcata* Crawford.)

In general this varietal form is very similar to the species. Although coloration is but superficial and seldom a true varietal character, yet this

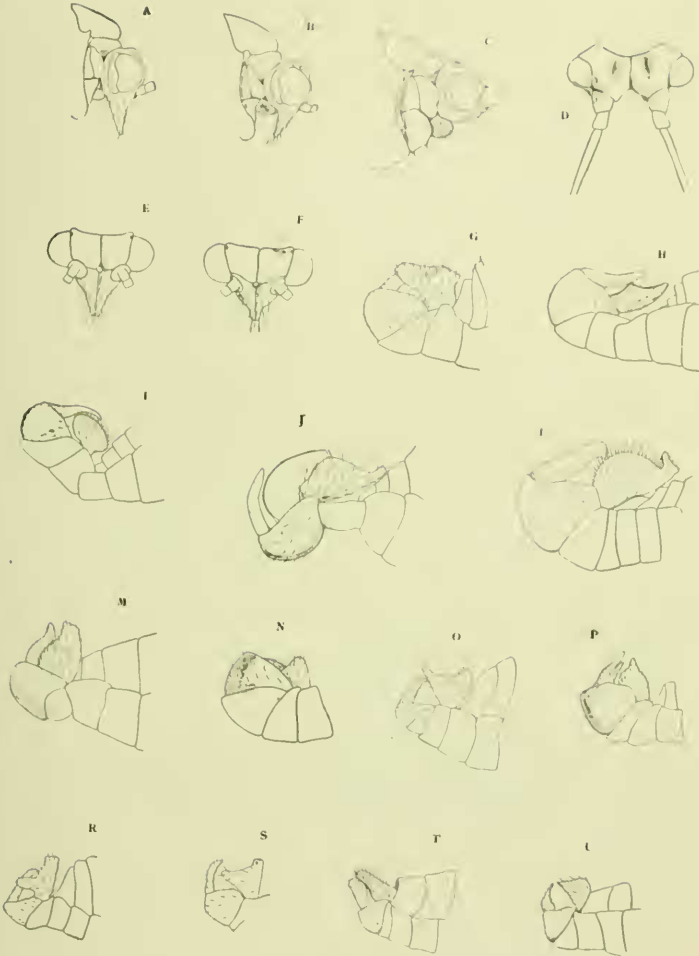


Figure 153. Heads and male genitalia of Trioziinae:

A, *Neotrioza immaeulata*; B, *N. laticeps*; C, D, *Rhinopsylla antennata*; E, *Neotrioza immaeulata*; F, *N. laticeps*; G, *Trioza tripunctata*; H, *T. quadripunctata*; I, *T. assimilis*; J, *T. proxinata*; L, *T. mexicana*; N, *Allotrioza magnolia*; O, *N. A. arbolensis*; O, *Paratrioza maculipennis*; P, *Epitrioza medicaginis*; R, *Paratrioza ocellata*; S, *P. cockerelli*; T, *Neotrioza immaeulata*; U, *Rhinopsylla antennata*.

is the most apparent difference between the species and its variety. The species is brownish red to orange, usually quite light colored, whereas the varietal form is very dark reddish brown. The principal structural differences are thoracic; the dorsulum in the variety is distinctly less arched than in the species, and the notum is finely pubescent; the notum of the species is also pubescent but much less conspicuously.

These two forms were separated as species in the provisional synopsis chiefly on the difference in the trend of the facial cones, but this is not a sufficiently constant character to warrant this separation.

The form mentioned in the provisional synopsis as *Trioza sulcata similis* is found on further study to be identical with *T. frontalis*. Therefore the varietal name becomes synonymical.

***Trioza similis fovealis* (Crawf.)**

(Syn. *Trioza fovealis* Crawford)

(Fig. 152, H; 154, I)

This varietal form is very similar to the species in almost all characters. The following differences make it evident that it is truly a variety. The facial cones are distinctly shorter and less slender in the varietal form; the epimeron is not so prominent as in the species; the tergites of the abdomen are concolorous with the sternites; this character is of more importance than it might at first thought seem, since the relative coloration of the abdomen dorsad and ventrad is quite constant. The female genitalia are quite similar, though not exactly so. Described from one female taken in Colorado by C. F. Baker.

It will be noted in Fig. M, on page 348, Vol. II, No. 4 of the POMONA JOURNAL, that the frons and the insertion of the antennae is erroneously represented. The illustration presented for the varietal form is more correct for the species, also.

***Trioza albifrons* Crawf.**

(Fig. 154, L)

POMONA JOURNAL Ent. Vol. II, No. 4, page 355. The type locality of the species is Claremont, California. Subsequent to the description of the species numerous specimens of both sexes were collected at Nordhoff, California, by D. L. Crawford, on leaves of nettle (*Urtica holosericea*). Since only the male was known from the Claremont forms, the characters of the female are here added.

Female.—Abdomen large, stout. Genital segment long, almost three times as long as preceding ventral sclerite; dorsal plate very slightly longer and less acute than ventral plate; genital pore less than one-third the length of dorsal plate. Pubescence sparse.

***Trioza assimilis* Crawf.**

(Fig. 152, G; 153, I; 154, H; 155, G)

Length of body 2.3 mm.; length of forewing 3.3 mm.; greatest width 1.4 mm.; width of vertex between eyes .47 mm.; with eyes .70 mm. General

color dark orange red to dark brown with a reddish tinge, abdomen greenish white; thorax often lighter colored laterad.

Head moderately deflexed, with eyes not as broad as thorax, very finely punctate. Posterior margin of vertex slightly elevated narrowly, arcuate; vertex not raised plate-like; discal area almost plane; with a very shallow and slight depression in center; anterior margin quite strongly protruding over insertion of antennae, emarginate roundly at median suture; anterior ocellus under protrusion of vertex at base of facial cones. Facial cones medium in length, subacute, quite strongly divergent, subvertical to subhorizontal, usually not visible from above, moderately pubescent. Antennae normal, inserted on frons at base of facial cones laterad.

Thorax quite strongly arched, more coarsely punctate than vertex. Pronotum short, depressed below head and dorsulum; praepimeron usually only moderately visible, occasionally very prominent. Dorsulum strongly ascending, roundly acute cephalad. Scutum quite broad. Metasternal spurs small. Wings hyaline, almost two and one-half times as long as broad, broadest across first marginal cell, subacute to roundly acute apically, usually the latter; radius as long as second cubital; radial cell very slender throughout; marginal cells subequal, the second a trifle larger; anal angle usually concolorous with the rest of marginal veins, some times dark brown.

Male.—Abdomen more slender than that of female; flexible at fourth and fifth ventral sclerites. Genital plate not large; ventral plate normally rounded caudad and horizontal dorsad; claspers quite long, slender, acute, simple; anal valve rather small, extending scarcely to base of claspers; composed of two simple elliptical flaps, with a row of hairs dorsally. Pubescence sparse and brief. *Female*.—Genital segment moderately large, longer than preceding ventral sclerite; dorsal plate longer and less acute than ventral; genital pore inclined toward anal tergite; pubescence sparse.

Described from numerous males and females collected by C. F. Baker in Santa Clara County, California, and three specimens in Ormsby County, Nevada.

This species is quite closely related to *T. aurantiaca* and *T. fulvata* Crawford. As was noted in *T. aurantiaca* there is in this species more or less gradual variation in the characters mentioned as variable in the foregoing description. Among all the specimens studied, three males were found to have a slightly more acute wing and a black anal angle, the two characters seeming to be associated.

Trioza mexicana n. sp.

(Fig. 152, I; 153, L; 154, G; 155, II)

Length of body (female) 2.6 mm.; length of forewing 3.6 mm.; greatest width 1.5 mm.; width of vertex between eyes .52 mm.; with eyes .87 mm. General color reddish brown, usually quite dark, occasionally lighter.

Head somewhat deflexed, with eyes not as broad as thorax, punctate. Posterior margin of vertex arcuate, scarcely elevated; vertex not raised plate-like, finely pubescent; discal area almost flat, with a slight foveal depression near

posterior margin on each side of the median suture. Facial cones large, long, subacute, quite strongly divergent, intermediate between vertical and horizontal, easily visible from above, sparsely pubescent. Antennæ inserted on frons at base of facial cones laterad. Eyes large, prominent. Labrum medium in size.

Thorax arched strongly, coarsely punctate. Pronotum moderately long, arched and strongly descending cephalad, depressed below head and more or less below dorsulum; propleurites narrow. Dorsulum moderately long, ascending to scutum. Metasternal spurs medium. Wings subhyaline, slightly dusky, covered over entire membrane with fine punctural dots; all veins with a double row of minute setæ; less than two and one-half times as long as broad, broadest across base of first marginal cell, broadly rounded apically; marginal cells subequal; second furcal quite strongly arched; venation prominent.

Male.—Abdomen more slender and smaller than in female. Genital segment large, rounded; claspers long, only slightly tapering, abruptly broadened at tip; anal valve very large, long; straight on anterior margin, lobately arched on posterior margin; with a small capitate lobe projecting caudad and dorsad; posterior margin with a conspicuous fringe. Pubescence sparse and brief. *Female*.—Abdomen stout. Genital segment large, not quite as long as rest of abdomen; dorsal plate longer than ventral; both plates acute, slightly serrate apically; genital pore fully one-fourth as long as dorsal plate; ovipositor quite long, not acutely pointed. Pubescence sparse and brief.

Described from four males and numerous females, collected in the mountains near Cuernavaca, Mexico (altitude 10,000 feet), by D. L. Crawford. Food plant: *Rhus* sp.

Trioza mexicana minuta n. var.

Body distinctly smaller than in the species. Head quite similar to species; pronotum comparatively shorter and more depressed; wings smaller, less dusky; setæ on veins less prominent, although present; venational characters similar. Genitalia very similar to species; male genitalia comparatively smaller.

Described from three females and one male collected at Oaxaca, Mex., by D. L. Crawford.

Rhinopsylla Riley

This genus was erected for the single species *Schwarzii*, in 1883. While this species possesses characteristics which evidently separate it generically, still the description of the genus was made so restrictive by Riley that closely related species could not be included in a generic group with this species. The following description of the genus is more general and only characters are mentioned which belong to the entire *Rhinopsylla* group of species, rather than to the single species described by Riley.

Body moderately slender, slightly arched dorsally, punctate. Head, including eyes, as broad or broader than thorax. Vertex very deeply and triangularly emarginate anteriorly at median suture, giving a very marked birostrate appearance. Antennæ attached to apex of rostra, greatly increasing the

peculiar birostrate appearance; basal segment of antennæ large and broad, second segment large, but smaller than first; third segment very long. Facial cones entirely wanting; face slightly swollen under insertion of antennæ.

This genus is very closely related, apparently, to the European genus *Bactericera* Puton, and in fact may be identical. The absence of the facial cones and the unusual length of the third antennal segment ally the two genera very closely. Low's description of *Bactericera* gives as characters of the vertex: "Vertex half as long as width between eyes; with two flat, broad impressions, rounded anteriorly and extending well forward; emarginate at median suture; posteriorly almost plane." It is quite probable that in the formation of the head the two genera are closely related. Until the European form becomes available for study, we should allow *Rhinopsylla* to stand as a very closely allied genus. The genus *Bactericera* can scarcely be erected into a subfamily, as distinct from *Triozinae*, as has been attempted by some, since there is too close a relationship existing between them.

Synopsis of the Genus *Rhinopsylla*

- A. Fore femora distinctly enlarged, compressed, and curved. Third antennal segment thicker midway than succeeding segments. Wings slender, more than three times as long as broad. *Rh. schwarzi* Riley.
- AA. Fore femora not distinctly enlarged, compressed nor curved. Third antennal segment slender, not thicker than succeeding segments. Wings only two and a half times as long as broad.
- B. Birostrate appearance of head very pronounced; basal segments of antennæ almost as broad as ends of projecting rostra. Body black. *Rh. antennata* Crawford.
- BB. Birostrate appearance less pronounced, basal antennal segments smaller; sulcate impressions of vertex more pronounced. Body orange. *Rh. antennata proxima* Crawford.

Rhinopsylla schwarzi Riley

Proceedings of the Biological Society of Washington, Vol. 11, 1882-84, page 77.

Rhinopsylla antennata (Crawford)

(Syn. *Paratrioza antennata* Crawford)

(Fig. 153, C, D, U; 155, S)

Length of body 1.8 mm.; length of forewing 2.7 mm.; greatest width 1.1 mm.; width of vertex between .44 mm.; with eyes .73 mm. General color black; abdomen white ventrad; antennæ and tarsi lighter.

Head not deflexed, with eyes about as broad as thorax, impunctate; broad posteriorly, when viewed laterally, and tapering toward insertion of antennæ. Posterior margin of vertex arcuate, scarcely elevated narrowly; vertex not raised plate-like; discal area with a distinct sulcate impression extending forward and toward lower margin of eye on each side, anterior margin deeply emarginate at median suture, making head appear strongly birostrate. An-

terior ocellus at apex or emargination, visible from above. Facial cones entirely wanting; face slightly swollen beneath each antennal insertion and sparsely pubescent. Antennæ inserted on truncate termination of rostrate lobes; basal segment very large and broad, almost as broad as anterior margin of projecting lobes; second segment smaller; third segment longer than fourth and fifth combined, slender, not broader than succeeding segments. Labrum moderately large, posterior.

Thorax scarcely arched, quite coarsely punctate. Pronotum moderately long, somewhat arched, not depressed below head and dorsulum; lateral impressions rather elongate, posterior; pleurites large. Dorsulum small. Anterior femora of normal length and thickness, scarcely arcuate. *Wings* hyaline, small, about two and a half times as long as broad, broadest across base of first marginal cell, subacute apically; radius shorter than second cubital; marginal cells subequal; fourth furcal terminating above apex of wing; venation light, inconspicuous.

Male.—Abdomen moderately stout; white ventrad, black dorsad. Genital segment small, not much larger than preceding ventral sclerite; claspers small, subglobose basally, slender and acute apically; pubescence short and sparse. Anal valve about equal in size to ventral plate, almost straight on inner margin, strongly arched posteriorly; pubescence longer than on genital plate and claspers.

Described from two males collected in Colorado, by C. F. Baker. Type in Nat. Museum.

Rhinopsylla antennata proxima n. var.

The chief variation from the species lies in the cephalic characters. The anterior emargination is less pronounced and the basal segments of the antennæ are distinctly smaller, but of the same type. The sulcate depression on the vertex is more marked. The facial cones are entirely wanting but the enlargements under the antennal insertions are more distinct. The color is lighter in the variety, but this is not necessarily a varietal character.

Described from one female collected in Colorado, by C. F. Baker.

Allotrioza n. gen.

Pronotum long, usually quite flat, not depressed below dorsulum and head; notum not strongly arched. Head not deflexed; vertex usually with a deep fovea posteriorly on each side of the median suture and more or less of a depression extending forward. Facial cones short, very broadly rounded apically, quite horizontal; labrum often visible from in front.

Wings quite acutely rounded apically; first marginal cell larger than second; first cubital vein comparatively short, scarcely ever more than twice as long as first furcal, sometimes equal in length to first furcal.

Type of genus: Allotrioza arbolensis Crawl.

Synopsis of the Genus *Allotrioza*

- A. Wings not entirely clear, more or less maculated. Facial cones subacute viewed from side. Præpisternum almost horizontal; epimeron inferior.

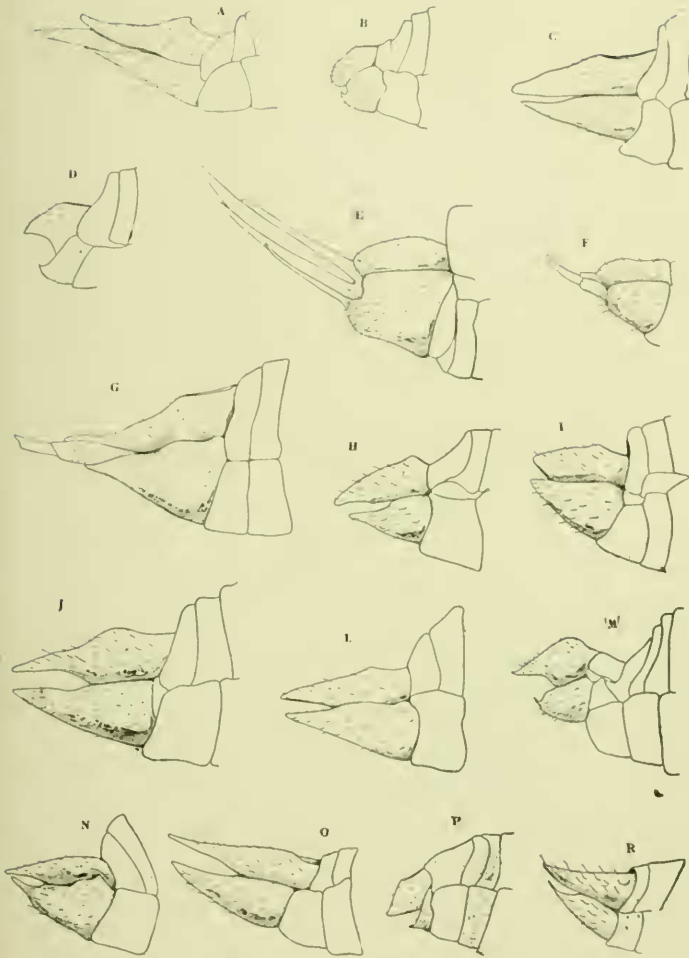


Figure 154. Female genitalia of Triozinae:

A, *Triozia tripunctata*; B, *T. minuta*; C, *T. quadripunctata*; D, *T. salicis*; E, *T. longistylus*; F, *T. nicaraguensis*; G, *T. mexicana*; H, *T. assimilis*; I, *T. similis fovealis*; J, *Allotriozia magnoliae*; L, *Triozia albifrons*; M, *Allotriozia arbolensis*; N, *Epitriozia medianginis*; O, *E. oaxacensis*; P, *Paratriozia ocellata*; R, *Neotriozia laticeps*.

- B. Both marginal cells and distal portion of cubital cell maculated. Wing subacute at apex. Vertex elevated distinctly along median suture. Body mottled. *A. maculata* Crawf.
- BB. With a more or less faint maculation across wing midway, from first marginal cell through most of radial cell; wing very acute at apex. Vertex more nearly flat, whitish. Body not mottled. *A. acutipennis* Crawf.
- AA. Wings entirely clear, not maculated. Facial cones broadly rounded. Propisternum vertical; epimeron posterior and lateral.
- B. Body very small. Wings small, and less than two and a half times as long as broad; radius very short and straight. Female genital segment about as long as dorso-ventral width. Anal valve of male small. Eyes small. *A. viridis* Crawf.
- BB. Body large. Wings large, more than two and a half times as long as broad; radius not very short. Eyes large.
- C. Second marginal cell smaller than first; fourth furcal one-fourth as long as second cubital. Propleurites small. Female genital segment longer than dorso-ventral width. Anal valve large, longer than claspers. *A. magnoliae* Ashm.
- CC. Second marginal cell as large as first; fourth furcal one-half as long as second cubital. Propleurites very large. Female genital segment not longer than dorso-ventral width. Anal valve small. *A. arbolensis* Crawf.

***Allotrioza arbolensis* (Crawf.)**

(Syn. *Paratrioza arbolensis* Crawf.)

(Fig. 152, J, M; 153, N; 154, M; 155, I)

Length of body 2.6 mm.; length of forewing 3.9 mm.; greatest width 1.5 mm.; width of vertex between eyes .60 mm.; with eyes .96 mm. General color light green throughout. Body very large.

Head not deflexed, very large, coarsely punctate. Posterior margin of vertex somewhat arcuate; vertex quite distinctly raised plate-like; discal area with a deep fovea on each side posteriorly, and a marked excision diverging toward insertion of antennae, deeper at the margins of the excision than in the middle; a prominent elevation left on each side of median suture not quite attaining anterior margin of vertex; median suture very prominent. Eyes very large. Facial cones short, horizontal, broadly rounded at apex, slightly flexed midway, quite divergent, moderately pubescent. Antennae large basally, inserted beneath margin of vertex more or less laterad. Labrum very large, easily visible from in front.

Thorax large, and broad, slightly broader than head including eyes, more coarsely punctate than vertex. Pronotum very long, about one-third as long as dorsulum, not depressed below dorsulum and head; with a fovea on each side above pleurites; propleurites large; episternum unusually large. Dorsulum broad, but not proportionately long, rather triangular, quite acute cephalad.

Metasternal spurs of medium size; anterior pair present but very small. *Wings* hyaline, large, straight on hind margin, front margin arched, not quite three times as long as broad, broadest across first fureal; fourth fureal almost one-half as long as second cubital, terminating at apex of wing.

Male.—Abdomen quite stout. Genital segment of medium size; claspers moderately large at base, subacute apically; anal valve rather small, simple. (In the only two male specimens available the claspers are drawn down into the genital plate and not entirely visible.) Pubescence moderate. *Female*.—Abdomen larger than in male. Genital segment rather small, scarcely longer than two preceding ventral sclerites; dorsal plate longer than ventral, acutely pointed; genital pore about one fourth as long as dorsal plate, on descending area; ventral plate acutely pointed; pubescence rather sparse.

Described from two males and four females collected by C. F. Baker in Arboles, Colorado. *Food-plant*; *Shepherdia*.

In the preliminary synopsis of *Triozinae* this species was included in the new genus *Paratrioza*. The limits of this genus have been subsequently altered and another genus erected to include this and several other closely allied species.

Allotrioza magnoliae (Ashm.)

(Syn. *Triozia magnoliae* Ashm. *Psylla magnoliae* Ashm.)

(Fig. 152, L; 153, M; 154, J; 155, J)

Length of body 2.7 mm.; length of forewing 3.8 mm.; greatest width 1.3 mm.; width of vertex between eyes .56 mm.; with eyes .94 mm. General color light yellowish green throughout. Body large.

Head not deflexed, large, quite coarsely punctate. Posterior margin of vertex arcuate, rather narrowly elevated between ocellar regions; vertex not raised plate-like; vertex very similar in excision to that of *A. arboleensis* and *A. maculata*, but less marked than either. Antennae inserted on frons sublaterad. Facial cones short, longer than in *A. arboleensis*, very broadly rounded apically subhorizontal, quite divergent, moderately pubescent. Labrum moderately large, scarcely visible from in front.

Thorax large, long and quite broad, broader than head including eyes, slightly arched. Pronotum long, flat, not depressed below head and dorsulum, with a plicate marking extending from pleurites on each side about half the distance upward, pleurites not unusually large; forecoxae large. Dorsulum long, longer than scutum, rather acutely rounded cephalad. Metasternal spurs of medium size. *Wings* hyaline, large, rather slender, fully three times as long as broad, broadest across first marginal cell, both margins quite nearly equally arched, subacute apically; first marginal cell much longer than second; first cubital not much longer than first fureal; fourth fureal about one fourth as long as second cubital, terminating distinctly above apex of wing.

Male.—Abdomen tapering roundly to genital segment; anal segment quite constricted. Genital segment moderately large, of usual form; claspers large basally, tapering abruptly, recurved at tip, almost as long as anal valve; anal valve truncate conical when viewed laterally, quite large. Pubescence

moderate. *Female*.—Abdomen larger than in male. Genital segment long, almost as long as rest of abdomen; both plates about equal in length and quite acute; genital pore long, about one-fifth as long as dorsal plate. Pubescence moderate.

Redescribed from one male and three females collected at Crescent City, Florida, and loaned from the National Museum by the kindness of Dr. L. O. Howard*

The original description was based on specimens taken at Jacksonville, Florida. For the brief and inadequate description as given at that time, see *Canad. Entom. Vol. XIII, No. 10, page 224*. The close resemblance in many respects to *A. arbolensis* is very marked; this resemblance was noted as a possibility in the preliminary synopsis, although no specimens were then available for comparison.

Allotrioza maculata (Crawf.)

(Syn. *Trioza maculata* Crawf.)

For the description of this species see *Pom. Journ. Entom., Vol. II, No. 4, page 349*, and figures accompanying.

Allotrioza acutipennis (Crawf.)

(Syn. *Trioza acutipennis* Crawf.)

Pom. Journ. Entom. Vol. II, No. 4, page 350, with illustrations.

Allotrioza viridis (Crawf.)

(Syn. *Trioza viridis* Crawf.)

Pom. Journ. Entom. Vol. II, No. 4, page 359, with figures.

Paratrioza n. gen.

Head more or less deflexed; vertex distinctly raised plate-like, pubescent, and margined with a band lighter in color than discal portion; center of discal area lighter than surrounding surface. Facial cones very short, small, acute, most easily visible from in front or above; antennae inserted on frons and outer basal portion of facial cones. Labrum visible from in front. Thorax not strongly arched. Wings rather small, usually about three times as long as broad. Abdomen short.

Type of genus: Paratrioza ocellata Crawf.

Synopsis of the Genus Paratrioza

- A. Wings maculated, quite acute at apex; radius short and straight; second marginal cell much smaller than first. Vertex and notum not conspicuously striped and banded. *P. maculipennis* Crawf.
- AA. Wings not maculated, subacute; radius rather long, curved; marginal cells subequal. Vertex and notum conspicuously striped and banded.
- B. Anal valve of male with a large, triangular, subacute posterior lobe; vertical axis shorter than horizontal. Facial cones horizontal, not porrect, projecting outwardly. Antennae inserted in front. Vertex with a brown macula in center. *P. cockerelli* Sulc.

BB. Anal valve of male larger, with a small rounded posterior lobe, vertical axis longer than horizontal. Facial cones perfect. Antennæ inserted somewhat laterad.

C. Vertex with markings white to dirty white.

D. Vertex discally with a white macula, more or less extensive.

P. ocellata Crawf.

DD. Vertex discally without macula. *P. ocellata nigra* Crawf.

CC. Vertex with markings fulvous to deep orange.

P. ocellata flava Crawf.

Paratrioza ocellata (Crawf.)

(*Paratrioza pulchella* Crawf.)

(Fig. 152, N, S; 153, R; 154, P; 155, M)

Length of body 1.5 mm.; length of forewing 2.7 mm.; greatest width 1.0 mm.; width of vertex between eyes .44 mm.; with eyes .75 mm. General color light to dark brown, to the naked eye; striped and banded on head and thorax, vertex black, with a whitish band bordering it and a white macula in center of discal area; dorsulum with a white stripe along median dorsal line, and a recurved stripe on each side extending from posterior margin semicircularly to near tegular epiphyses; scutum with a stripe on each side of the median dorsal line and an arcuate stripe sublateral. Body very small and short.

Head deflexed, with eyes about as broad as thorax, very finely punctate. Posterior margin of vertex arcuate, slightly raised narrowly; vertex elevated plate-like; pubescent; discal area with a slight foveal impression posteriorly, quite plane except the elevated ocellar regions; scarcely emarginate at median suture anteriorly. Anterior ocellus visible from in front. Facial cones small, acute, divergent, almost horizontal, moderately pubescent; not easily visible from side. Antennæ inserted on frons and outer base of facial cone. Labrum rather large, easily visible from in front.

Thorax arched, punctate. Pronotum short, slightly arched, depressed below dorsulum, anterior margin lower than post-ocellar regions of vertex, propi-meron mostly concealed; forecoxae small. Dorsulum small, subacute cephalad. Metasternal spurs small. *Wings* small, hyaline, about two and three-fourths times as long as broad, broadest across first furcal, subacute apically; radius about as long as second cubital; first cubital long; first marginal cell somewhat smaller than second; venation light yellowish brown.

Male.—Abdomen very short, more slender than in female. Genital segment rather short, larger than preceding ventral sclerite; claspers long arcuate, margins parallel, obtuse at apex; pubescence sparse and brief. Anal valve long, rather narrow, with a small rounded epiphysis on each flap posteriorly; pubescence longer than on genital plate. *Female*.—Genital segment very small; ventral plate very short, acute caudad; dorsal plate about as large preceding tergite, subacute at apex; genital pore almost half as long as dorsal plate; pubescence sparse.

Described from numerous males and females collected by C. F. Baker in Colorado and Arizona. Type in Nat. Museum.

The cephalic and thoracic color markings are quite characteristic and constant. There is a variation, however, in the discal macula of the vertex. In some specimens this macula extends arcuately to the post-ocelli, and is quite broad, while in others it is narrow and does not attain to the post-ocelli. In some individuals it even tends to disappear entirely. Although the variation is gradual and quite complete, it seems advisable to separate as a variety those forms in which the macula is scarcely present or entirely wanting.

The cephalic markings are quite uniformly of a white or flavous white color. In a few individuals this varies toward flavous rather than white. A second variety seems to exist in which the cephalic markings are distinctly flavous. The thoracic markings vary widely from white to dull dirty yellow.

Paratrioza ocellata nigra n. var.

General characters same as for species. Discal area of vertex without macula or stripe.

Paratrioza ocellata flava n. var.

General characters as for species. Cephalic markings dark flavous. Thoracic markings lighter flavous.

Paratrioza cockerelli (Sulc.)

(*Trioza cockerelli* Sulc.)

(Fig. 153, S; 155, L)

Length of body 1.3 mm.; length of forewing 2.6 mm.; greatest width 1.0 mm.; width of vertex between eyes .39 mm.; with eyes .60 mm. General color light brown to brown, as seen with the naked eye; vertex colored very similarly to *P. ocellata* but less markedly so; thorax not so distinctly striped as *P. ocellata*.

Head deflexed, with eyes not as broad as thorax, very finely punctate. Vertex raised plate-like, pubescent; discal area with a small foveal impression posteriorly on each side of the median suture; emarginate on anterior margin above insertion of antennae; scarcely emarginate at median suture; anterior ocellus under projecting vertex. Facial cones very small, subacute when viewed from in front, scarcely visible from side; projecting outward from face over insertion of antennae; labrum prominent; antennae inserted on frons more nearly in front than in *P. ocellata*.

Thorax arched, punctate. Pronotum arched, depressed below dorsulum and head slightly; prepimeron mostly concealed. Dorsulum small, subacute cephalad. *Wings* hyaline, small, a little more than two and a half times as long as broad, broadest across first marginal cell; radius about as long as second cubital; marginal cells subequal.

Male.—Genital segment rather small; claspers long, arcuate, obtuse at apex; anal valve long, straight on anterior margin, with a posterior, triangular lobe projecting from almost entire vertical length; vertical axis shorter than horizontal axis from tip of posterior lobe to center of anterior vertical margin. Pubescence sparse. *Female*.—Genital segment very similar to that of *P. ocellata*; ventral plate relatively a little larger.

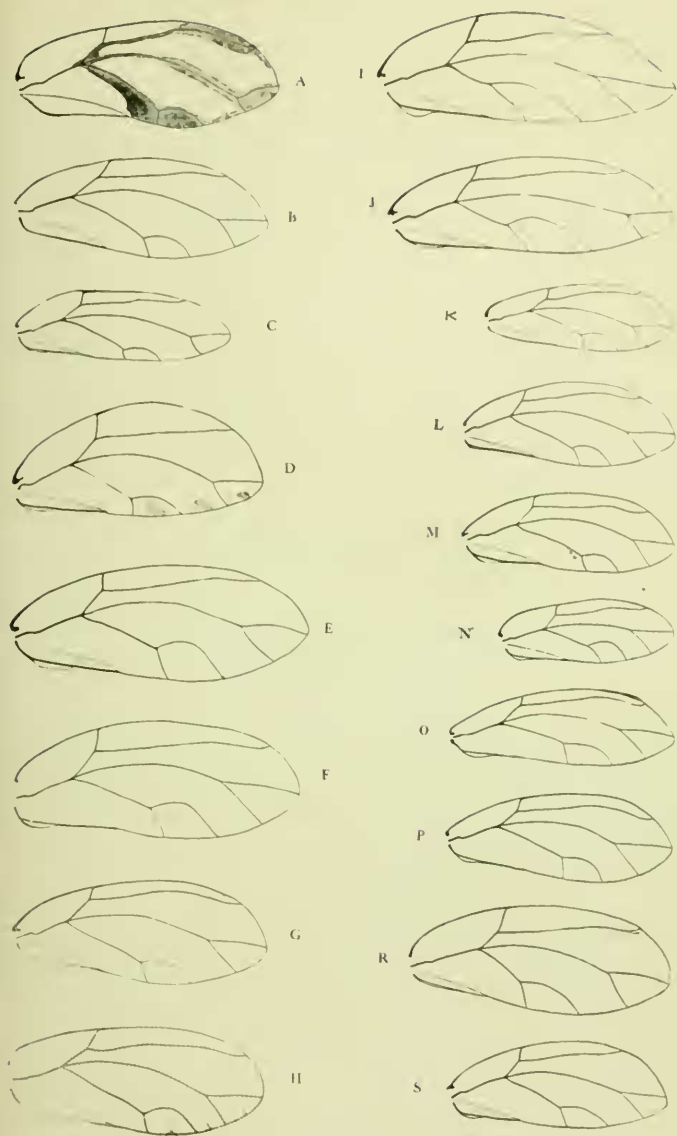


Figure 155. Wings of Trioziinae:

A, *Trioza tripunctata*; B, *T. salicis*; C, *T. minuta*; D, *T. quadripunctata*; E, *T. longistylus*; F, *T. proximata*; G, *T. assimilis*; H, *T. mexicana*; I, *Allotrioza arbolensis*; J, *A. magnoliae*; K, *Trioza nicaraguensis*; L, *Paratrioza cockerelli*; M, *P. ocellata*; N, *Epitrioza medicaginis*; O, *Neotrioza laticeps*; P, *N. immaculata*; R, *Epitrioza oaxacensis*; S, *Rhinopsylla antennata*.

Redescribed from one male collected at Boulder, Colorado, by Prof. T. D. A. Cockerell. *Food-plant: Capsicum annuum* (pepper).

The single male specimen sent me by Prof. Cockerell was imperfectly colored as compared with the description by Sulc. His characterization of color and of the genitalia of both sexes was used in the above description since these characters were not readily available in my specimen. The striking similarity to *P. ocellata* is apparent. The two species may be distinguished by the following characters:

Paratrioza ocellata: Facial cones nearly porrect and horizontal; antennae inserted on frons sublateral; vertex with a white macula in center; thorax; usually distinctly striped. Anal valve of male long and rather narrow, with a small rounded epiphysis posteriorly; vertical axis longer than horizontal axis.

Paratrioza cockerelli: Facial cones not porrect, projecting outwardly, horizontal; antennae inserted more nearly in front; macula in center of vertex brown; thorax not distinctly striped. Anal valve of male relatively shorter; posterior lobe or epiphysis large, triangular, long at base, subacute at apex; vertical axis shorter than horizontal axis.

Paratrioza maculipennis (Crawf.)

(Syn. *Triosa maculipennis* Crawf.)

(Fig. 153, O)

Pomona Journ. Entom. Vol. II, No. 2, page 237.

The facial cones are somewhat larger and more prominent in this species, but are manifestly of the same type. The male genitalia are more accurately represented in the figure herewith shown than in the location cited above.

Neotrioza n. gen.

Head with eyes distinctly broader than thorax. Facial cones quite long, very slender and acute, closely appressed and not in the least divergent. Vertex raised plate-like. Antennae inserted in front below vertex. Thorax very slender and narrow. Pronotum short, depressed below head and dorsulum.

Type of genus: Neotrioza immaculata Crawf.

Synopsis of the Genus Neotrioza

- A. Facial cones long, vertical; cone into eye more than 1. Wing about two and a half times as long as broad. *N. immaculata* Crawf.
 AA. Facial cones retrose, not very long; cone into eye less than 1. Wing fully three times as long as broad. *N. laticeps* Crawf.

Neotrioza immaculata (Crawf.)

(*Triosa immaculata* Crawf.)

(Fig. 153, A, E, T; 155, P)

Length of body 1.7 mm.; length of forewing 2.7 mm.; greatest width .9 mm.; width of vertex between eyes .36 mm.; with eyes .59 mm. General color dark brown, thorax lighter; vertex black with yellowish border; facial cones whitish; antennae black throughout.

Head quite strongly deflexed, scarcely punctate, with eyes distinctly broader than thorax. Posterior margin of thorax only slightly elevated narrowly, arcuate, not emarginate at median suture; vertex slightly pubescent, raised plate-like, with the border yellowish orange in color and the discal area black, discal area quite plane, except the elevated postocellar regions; anterior margin somewhat emarginate at median suture and slightly deflexed; anterior ocellus at base of facial cones and median suture of vertex. Facial cones long, slender, closely appressed and not divergent, very acute, vertical, very sparsely pubescent. Antennae inserted on frons, not laterad; very slender; two basal segments quite slender.

Thorax arched, very slender and narrow, slightly punctate, sparsely and briefly pubescent. Pronotum short, depressed below dorsulum and head, pleurites small. Dorsulum ascending, narrow, rather broadly rounded cephalad. Metasternal spurs small and short. *Wings* small, hyaline, a little more than two and a half times as long as broad, broadest across second furcal, subacute apically; radius longer than second cubital; second furcal shorter than fourth furcal.

Male.—Abdomen slender, not arched. Genital segment small; ventral plate not as large as anal tergite; claspers spatulate, of medium length; anal valve long, extending to apical margin of ventral plate, broader at base than at tip; pubescence rather dense.

Described from one male collected at Algonquin, Illinois, by Dr. Nason

***Neotrioza laticeps* (Crawf.)**

(*Trioza laticeps* Crawf.)

(Fig. 153, B, F; 154, R; 155, O)

Length of body 1.6 mm.; length of forewing 2.7 mm.; greatest width 1.0 mm.; width of vertex between eyes .38 mm.; with eyes .02 mm. General color dark brown, thorax lighter; head and facial cones black.

Head strongly deflexed, with eyes distinctly broader than thorax, very slightly punctate. Posterior margin of vertex only slightly elevated narrowly, arcuate, not emarginate at median suture; vertex raised plate-like, slightly pubescent; quite black; discal area plane, except elevated postocellar region; anterior margin emarginate at median suture; anterior ocellus at base of facial cones and emargination of vertex. Facial cones long, shorter than in *N. immaculata*, slender, acute, closely appressed and not divergent, vertical or retrose, slightly pubescent. Antennae inserted on frons below frontal plates of vertex, in front; very slender; basal segments quite slender.

Thorax arched, slender and narrow, punctate, briefly and sparsely pubescent. Pronotum short, depressed below head and dorsulum; pleurites normal. Dorsulum ascending, narrow, quite broadly rounded cephalad. *Wings* hyaline, small, slender, fully three times as long as broad, broadest across first marginal cell, subacute apically; radius as long as second cubital; second furcal fully as long as fourth furcal.

Female.—Abdomen slender. Genital segment almost as long as rest of abdomen, very acute caudad; dorsal plate longer and heavier than ventral.

genital pore about one-fifth as long as dorsal plate; ventral plate quite linear and very acute distally; pubescence sparse.

Described from one female collected by G. R. Pilate in Louisiana.

Epitrioza n. gen.

Head small, scarcely deflexed; vertex more or less excised; facial cones almost obsolete, reduced to globose lobes scarcely visible from the side. Antennæ inserted on frons and base of facial cones laterad; labrum easily visible from in front below facial cones.

Thorax not strongly arched, broader than head including eyes; pronotum rather short, distinctly arched and scarcely depressed below head and dorsulum; præpimeron only slightly visible; propleurites set rather obliquely; forecoxæ almost entirely visible in front of the mesepisternum. Wing venation quite similar to typical *Triozinae*; first cubital scarcely more than twice the length of first furcal.

Type of genus: *Epitrioza medicaginis* Crawf.

Synopsis of the Genus *Epitrioza*

A. Body very small; wings small, less than 2.5 mm. in length, slightly coriaceous. Vertex raised somewhat plate-like, bulging over insertion of antennæ. Pronotum quite long. Forecoxæ short. Genital segment of female scarcely longer than dorso-ventral width.

E. medicaginis Crawf.

AA. Body normally large. Wings normal, more than 3 mm. in length, hyaline. Vertex not raised plate-like, not bulging over insertion of antennæ. Pronotum quite short. Forecoxæ long. Female genital segment about twice as long as basal dorso-ventral width.

E. oavaccensis Crawf.

Epitrioza medicaginis (Crawf.)

(*Paratrioza medicaginis* Crawf.)

(Fig. 152, O, R; 153, P; 154, N; 155, N)

Length of body 1.7 mm.; length of forewing 2.6 mm.; greatest width 1.0 mm.; width of vertex between eyes .43 mm.; with eyes .68 mm. General color yellowish green throughout. Body small, slender.

Head scarcely deflexed, small, with eyes not quite as broad as thorax, somewhat punctate. Posterior margin of vertex arcuate, slightly elevated narrowly; vertex raised somewhat plate-like; discal area with a distinct fovea on each side of median suture, near posterior margin and an oblique depression extending forward and toward eyes; anterior margin moderately emarginate at median suture above anterior ocellus. Facial cones reduced to two rather large globose lobes extending vertically downward, scarcely visible from side, slightly pubescent; antennal insertions prominent, occupying large area laterad. Labrum large, prominent below facial cones from in front.

Thorax small, not strongly arched, quite coarsely punctate; pronotum short, arched, not depressed below head and dorsulum; sides quite parallel; propleurites obliquely set; præpimeron small; forecoxæ small, almost entirely

visible. Dorsulum ascending, quite small. Metasternal spurs quite small. *Wings* small, hyaline, but very faintly coriaceous; less than three times as long as broad, broadest across first furcal, rounded apically but not broadly so; radius as long as second cubital; first cubital about twice the length of first furcal; fourth furcal fully half as long as second cubital; marginal cells subequal; venation rather inconspicuous.

Male.—Abdomen long and slender. Genital segment medium in size; genital plate rounded; claspers bicuspidate, the posterior cusp longer, slightly more acute, glabrous; the remainder of surface of claspers sparsely pubescent; anal valve quite large, broad at base, distally more slender and terminating in an uniformly tapering epiphysis; sparsely pubescent. *Female*.—Abdomen very long, less slender than in male. Genital segment moderately large; both plates of almost equal length, quite acute; genital pore small; sparsely pubescent.

Described from one male and one female collected by T. D. A. Cockerell in Colorado. *Food plant*: *Medicago sativa* (alfalfa).

Epitrioza oaxacensis n. sp.

(Fig. 152, P; 154, O; 155, R)

Length of body 1.9 mm.; length of forewing 3.3 mm.; greatest width 1.2 mm.; width of vertex between eyes .45 mm.; with eyes .70 mm. General color light green with a tinge of yellow. Body medium in size.

Head scarcely deflexed, small, punctate; posterior margin of vertex areolate, very slightly elevated narrowly; vertex not raised plate-like; discal area with a distinct fovea on each side near posterior margin and a short sulcate depression extending toward eye. Anterior margin somewhat emarginate at median suture. Facial cones reduced to globose lobes, very slightly angulated on inner margin; slightly visible from side, sparsely pubescent; labrum visible from in front below facial cones. Antennae inserted on frons and base of facial cones sublateral.

Thorax moderately arched, broader than head including eyes, quite coarsely punctate; pronotum short, arched, scarcely depressed below head and dorsulum, broader at pleurite than dorsally; propleurites obliquely set; prepimeron small; forecoxae moderately large, almost entirely visible from in front of mesepisternum. Dorsulum moderately long, usually very narrow, occasionally normally broad, rounded cephalad. *Wings* rather large, hyaline, about two and a half times as long as broad, broadest across first marginal cell, quite broadly rounded apically; radius as long as second cubital; first cubital just twice the length of first furcal; fourth furcal slightly less than half the length of second cubital; marginal cells subequal; one specimen presents the anomaly of the furcation distally of the radius of both primary wings.

Female.—Abdomen moderately stout. Genital segment long, slender; dorsal plate slightly longer than ventral, equally acute but less slender; genital pore small, elliptical; pubescence sparse and brief.

Described from four females collected by D. L. Crawford at Oaxaca, Mex.